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SOLICITATION AMENDMENT
MODIFICATION DE L'INVITATION

The referenced document is hereby revised; unless otherwise indicated, all other terms and conditions of the Solicitation remain the same.

Ce document est par la présente révisé; sauf indication contraire, les modalités de l'invitation demeurent les mêmes.

Comments - Commentaires

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Title - Sujet HVAC Controls & System Upgrade	
Solicitation No. - N° de l'invitation EB144-161601/A	**Amendment No. - N° modif.** 005
Client Reference No. - N° de référence du client EB144-16-1601	**Date** 2015-11-24
GETS Reference No. - N° de référence de SEAG PW-$PWA-110-5314	
File No. - N° de dossier PWA-5-74121 (110)	**CCC No./N° CCC - FMS No./N° VME**
Solicitation Closes - L'invitation prend fin **at - à 02:00 PM** **on - le 2015-12-10**	**Time Zone** **Fuseau horaire** Atlantic Standard Time AST
F.O.B. - F.A.B. **Plant-Usine:** ☐ **Destination:** ☑ **Other-Autre:** ☐	
Address Enquiries to: - Adresser toutes questions à: Collier (PWA), Susan	**Buyer Id - Id de l'acheteur** pwa110
Telephone No. - N° de téléphone (902) 496-5350 ( )	**FAX No. - N° de FAX** (902) 496-5016
Destination - of Goods, Services, and Construction: **Destination - des biens, services et construction:**	

Instructions: See Herein

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Canada

Amendement 005 est éduqué à intégrer les éléments suivants:

Supprimer dans son intégralité:
Date de clôture

Insérer:
Sollicitation ferme à 14h00, heure normale de l'Atlantique (AST) sur 10.12.2015.

Question 1
Y at-il plus de dessins entre H305 et H310?

Réponse: 1
Il y avait deux (2) dessins électriques disparues et quatre (4) des dessins mécaniques manquant. Le ont été ajoutés comme un amendement suivant:

E308
E601
H306
H307
H308
H309

Question: 2
Le dessin H100 il ya une liste de dessin mécanique qui comprend dessins H306, H307, H308 et H309. Ces quatre dessins ne sont pas analysés sur votre site web. Sont-ils censés être inclus dans le cadre de ce projet?
Réponse: 2
Il y avait deux (2) dessins électriques disparues et quatre (4) des dessins mécaniques manquant. Le ont été ajoutés comme un amendement suivant:

E308
E601
H306
H307
H308
H309

Question: 3
Il semble que les dessins manquants sont:
E308, E601, H306, H307, H308, H309
Réponse: 3
Il y avait deux (2) dessins électriques disparues et quatre (4) des dessins mécaniques manquant. Le ont été ajoutés comme un amendement suivant:

E308
E601
H306
H307
H308
H309

Question: 4
Je vous écris pour demander l'acceptation sur le racolage # EB144-161601 / A Contrôles CVC et de mise à niveau du système, AAC à Kentville Centre de recherches de laboratoire. Plus précisément, nous demandons l'acceptation de la Section 25 - Suivi de l'énergie et de contrôle et à être ajouté à la liste.

Réponse: 4
S'il vous plaît fournir toute la documentation d'appui nécessaire pour démontrer que le fournisseur de l'EMCS peut répondre aux exigences de toutes les sections dans la division 25 de la spécification. Ceci est à inclure, mais sans s'y limiter; des informations détaillées sur les produits proposés pour le contrôle de laboratoire et la construction de base de contrôle de CVC, y compris l'architecture du système.
L'information fournie est d'être précis projet. Soumissions référençant des liens ou des catalogues produit Web génériques ne seront pas acceptées.

The bid documents shall be amended, and new drawings and clauses added, and shall become part of the contract documents as follows:

Drawings

1) **Reference Drawing H307:**

.1 Revise existing Heat Recovery Coil No. 1 Note to read as follows:

"Existing Heat Recovery Coil No.1 and all associated redundant piping, pumps, equipment and fittings to be removed. Cap existing piping at Penthouse Floor Level."

Specifications:

1) **Reference Specification Section 01 10 10:**

.1 Add 01 10 10, 1.1.2.18 as follows:

".18 Control Wiring to be run in conduit in all exposed areas, including the Mechanical Penthouse, the Mechanical Chase, and the 1st Floor Mechanical Room. Control Wiring in ceiling plenums may be run in free air on J-hooks. Control wiring drops in walls to sensors and devices to be run in conduit."

.2 Add 01 10 10, 1.1.2.19 as follows:

".19 All cutting and patching is the responsibility of this Contractor. Damage to existing finishes caused by this contractor is to be repaired/replaced by this Contractor. See Spec Section 01 10 10, 1.13."

2) **Reference Specification Section 01 78 00:**

.1 Revise 01 78 00 Closeout Submittals as follows: Delete Page #7 (blank).

3) Reference Specification Section 23 05 93:

.1 Revise 23 05 93, 1.1.8.1.6 to read as follows:
".6 PWGSC MD15128-2013 Laboratory Fume Hoods."

.2 Revise 23 05 93, 1.3.1.4.1 to read as follows:
".1 Air Balancing and Verification to meet PWGSC MD15128-2013 and Section 23 05 93.13."

4) Reference Specification Section 23 05 93.13:

.1 Revise all references to "PWGSC MD15128-2008, Laboratory Fume Hoods" or "MD15128" to read as follows:

"PWGSC MD15128-2013 Minimum Guidelines for Laboratory Fume Hoods".

5) Reference Specification Section 23 38 00:

.1 Revise 23 38 00, 1.2.1.1 to read as follows:

".1 PWGSC MD15129-2006, Perchloric Acid Fume Hoods and Their Exhaust Systems."

6) Reference Specification Section 23 38 16.13:

.1 Revise all references to "PWGSC MD15128-2008, Laboratory Fume Hoods" or "MD15128" to read as follows:

"PWGSC MD15128-2013 Minimum Guidelines for Laboratory Fume Hoods".

.2 .1 Revise 23 38 16.13 1.7.4 to read as follows:

".4 ....."PWGSC MD15128-2013", not "PWGSC MD12128" as noted.

Delete in its entirety:
Specification Section 26 05 01

Insert under Specification:
FACILITY COMMISSIOING Section 26 05 01

Part 1 General

1.1 GENERAL

.1 Read and conform to:
.1 Comply with Division 01 – General Requirements and documents referred to herein.

1.2 DEFINITIONS

.1 Validate (for tests and demonstrations): to witness and authenticate successful performance demonstration or record deficiencies; to authenticate, after correction, successful demonstration; these authentications of the tests become references for the Departmental Representative's certification.

.2 Witness: The Commissioning Authority will observe as required and record summary of test results.

.3 Commissioning Authority: Commissioning Authority in charge of the commissioning process and recommends final acceptance.

1.3 REFERENCES

.1 Latest editions of the following codes and standards:
.1 CSA C22.1, Canadian Electrical Code, Part 1 - Safety Standard for Electrical Installations.
.2 CSA C22.2 No. 178.1, Transfer Switch Equipment (Tri-national standard, with NMX-J-672 ANCE and UL 1008).
.3 NSBC, Nova Scotia Building Code.

1.4 DOCUMENTS

.1 In case of discrepancies or conflicts between documents, documents will be governed in the sections of Division 01 - General Requirements.

1.5 COMMISSIONING OBJECTIVES

.1 Objectives of commissioning process are:
.1 To support quality management through monitoring and checking of installation.

.2 To verify system performance through testing and commissioning of completed installation.

.3 To move completed facility from "static completion" state to optimal "dynamic" operating state.

.4 To transfer facility from Contractor to Owner in such a manner that provision of a quality facility to Owner has been assured.

.5 To optimize operating and maintenance through delivery of comprehensive quality training and instruction to Owners operating personnel.

.6 To assure provision of accurate and useful historical records, such as, as-built drawings, test certificates, etc. to Owner. Such records provide important data for operating and maintaining systems as well as for future system testing, maintenance or renovations and to trouble shoot and repair the components of systems.

.7 To extend commissioning into operational phase in order to verify performance levels under a range of operating conditions; such as change of seasons. This process will help to avoid unforeseen or hidden operating and maintenance expenses that may develop later on.

.8 Monitor operation, performance and maintenance programs; optimize system's performance under normal operating conditions, partial occupancy, and full occupancy, under the direction and review of Commissioning Authority. This phase lasts throughout warranty period. It may, however, involve activities to ensure completion of:

.1 System debugging and optimization.

.2 Completion of training and instruction for operating and maintenance personnel.

.3 Completion of all commissioning activities on defective, seasonally-sensitive systems, for varying modes and periodic simulated emergency conditions.

.9 Commissioning shall be considered complete when all of the objectives of commissioning, as specified herein, have been achieved.

1.6 COMMISSIONING MEETINGS, SCHEDULING AND REPORTING

.1 The Contractor shall include the commissioning plan in their construction schedule and shall schedule for all tests and equipment start-up in the construction schedule.

.2 Commissioning meetings shall be scheduled as required. The meetings shall address commissioning related responsibilities as well as all specified testing, documentation, O&M manuals, training, and post construction requirements. The testing schedules and results of all tests shall be reviewed at the meetings.

.3 Where construction may be completed in phases, allow for the frequency of meetings to correspond to the varying stages of construction of each phase.

.4 The Contractor shall attend commissioning meetings at regular intervals, as called by the Commissioning Authority.

.5 The Contractor shall schedule work to include specified commissioning related tasks. Cooperate with the Owner's Commissioning Authority, and coordinate sub-trades as required, to successfully demonstrate and verify commissioning related tests.

.6 The Contractor shall schedule work to include specified Commissioning related testing prior to Owner's demonstration and Owner's training.

.7 Testing forms and reports associated with the electrical systems shall be directed to the Departmental Representative and the Commissioning Authority.

.8 The forms and reports to be issued shall include:

.1 Shop drawings, issued and accepted;

.2 Equipment verification forms;

.3 Testing forms;

.4 Reports resulting from tests;
.5 Testing schedule;
.6 Minutes of commissioning meetings.

1.7 WARRANTY

.1 Involvement of Commissioning Authority does not void any guarantees or warranties nor does it relieve Contractor of any contractual responsibilities.

1.8 RESPONSIBILITIES OF COMMISSIONING AUTHORITY

.1 Responsibilities of Commissioning Authority are as follows:
  .1 Design Phase:
    .1 Participate in design team meetings. Obtain Owner's requirements and Departmental Representatives philosophy and intent and expected system performance. This will form the basics of the testing and commissioning documents.
    .2 Provide input and feedback to design team with emphasis on testing, commissioning, operation and maintenance of the proposed system and equipment.
    .3 Provide commissioning document to form part of the Bid documents.
  .2 Construction Phase:
    .1 Review Contractor's approved shop drawing submission for commissioning related issues.
    .2 Prepare commissioning plan based on the contractor's schedule and installation method statement.
    .3 Monitor, check and inspect the installation throughout the construction stages.
    .4 Supervise the commissioning, including scheduling.
    .5 Issue deficiencies reports noting any issues that may have an impact on the commissioning of the equipment or system.
    .6 Attend construction site meetings as required to discuss commissioning related items and any impact on Project schedule.
    .7 Set-up and chair commissioning meetings.
    .8 Witness and validate tests as required; note deficiencies and issue progress reports.
    .9 Work with the project team to expeditiously resolve any problems that may arise due to site conditions.
    .10 Prepare Systems Operating Manual.
    .11 Co-ordinate with Owner, training and instructions provided by Contractors, manufacturers and Suppliers.
  .3 Post-Construction Phase:
    .1 Prepare final report on commissioning, identifying any deficiencies that may be outstanding.
    .2 Recommendation of any additional training and/or instruction of operating and maintenance personnel deemed necessary over and above that already provided.
    .3 Complete system checks with Contractor:
      .1 Once during the first month of building operation.

.2 Once during the third month of building operation.
.3 Once between the fourth and tenth months in a season opposite to the first or third month visit.

1.9 RESPONSIBILITIES OF OWNER

.1 Responsibilities of Owner are as follows:
.1 To provide operating personnel to attend training and instruction regarding specific components, equipment and systems.
.2 To retain the services of independent third parties for system verification and certification as required in the document or by applicable codes.
.3 To observe on-site installation, start-up and testing equipment and systems.

1.10 RESPONSIBILITIES OF DEPARTMENTAL REPRESENTATIVE

.1 Responsibilities of Departmental Representative are as follows:
.1 Review contractor's shop drawings submission to ensure that the equipment proposed comply with specifications requirements.
.2 Review contractor's installation program to ensure that the installation sequences have been coordinated with the project schedule.
.3 Monitor, check and inspect the installation throughout the construction stages to ensure the equipment installation is as approved and the installation method, workmanship, procedures will follow the approved submission and method statement.
.4 Inspect the systems installation and issue deficiencies reports. Ensure deficiencies are corrected and certify installation of systems.
.5 Review contractor's commissioning plan to ensure the proposed tests, the sequences and method of tests conform to the contract requirements; the testing and commissioning sequences coincide with the project schedule.
.6 Review operating and maintenance manuals, balancing and test reports and as-builts for accuracy.
.7 Witness tests; note any deficiencies and provide progress report.

1.11 RESPONSIBILITIES OF CONTRACTOR

.1 Responsibilities of Contractor are as follows:
.1 Construction Phase:
.1 To manage and ensure entire installation comply with requirements of the Contract Documents.
.2 Submit shop drawings complete with Contractor's Stamp of Review.
.3 Submit working detail (interference or installation) drawings, as required.
.4 The Contractor shall coordinate with the Commissioning Authority to prepare the Construction Commissioning Plan.
.5 Complete commissioning data test forms.
.6 Submit installation method statement. This generally includes:
.1 Method of equipment delivery to the installation location on site.
.2 Prerequisite preparation for delivery, such as completion of the factory testing and the completion of site work to accept this equipment.

.3 Installation method and sequences of installing the equipment and the associated connections to the equipment.

.7 Submit an installation schedule. This schedule shall include:

.1 Time schedule of each activity, with lead and lag time allowed and indicated.

.2 Shop drawings and working detail drawings submission.

.3 Major equipment delivery and factory testing date.

.4 Coordinated installation activities and sequences in compliance with the Construction Manager's project schedule and other trade's installation schedule.

.5 Schedule of testing and commissioning of the systems and major equipment.

.8 Submit a commissioning schedule. This schedule shall include:

.1 Time schedule for system and equipment commissioning which are in compliance with the timing and sequences of installation schedule stated above. In this schedule allow for additional time for testing and commissioning, such that re-test of the equipment can be performed in a timely manner if required without impacting the overall project schedule or cause delay to Project completion.

.2 Dates for completion of required factory tests prior to equipment delivery to the site shall be indicated in the schedule.

.3 Prepare and submit testing and commissioning method statements for review and approval.

.4 Prepare and submit testing and commissioning record or report forms for review and approval.

.9 Attend progress and commissioning meetings.

.10 Promptly rectify or replace reported deficiencies and defects.

.11 Where required by codes and/or specification, retain manufacturers and/or independent third parties to provide service for testing and certification of the systems and training of Owner's personnel.

.12 Provide training and instruction to the Owner's operating personnel.

.13 Perform testing and commissioning of equipment and systems to the satisfaction of the Departmental Representative and Commissioning Authority as stated in approved schedule and method described above. Testing and commissioning will be witnessed by the Commissioning Authority as required. Contractor or his retained agents shall also record procedure and findings in approved test and record forms. Submit test and record forms with the signature of the tester for review and approval to the Departmental Representative and Commissioning Authority.

.14 Pay for and be responsible for all inspections required by codes, specification and Authorities having Jurisdiction. Obtain and submit all Certificate of Approval for such inspections and verifications.

.15 Submit for review as-builts drawings including those for location of control devices and wiring and operating and maintenance manuals for each piece of equipment as per the specification requirements.

.16 Provide Operating and Maintenance Manuals for review by the Departmental Representative and Commissioning Authority with all the testing and commissioning results and reports incorporated.

.17 Obtain, issue and assign warranties for equipment and systems to the Owner.

.18 Provision of all necessary test equipment shall be the responsibility of the contractor. Provide recently validated calibration certificates for all equipment to be used for verification prior to testing and commissioning commencement.

.2 Post-Construction Phase:

.1 Optimize operation according to occupant's needs, using the System Operation Manual prepared by the Commissioning Authority as reference points.

.2 Complete all commissioning procedures and activities and performance verification procedures which were delayed or not concluded during the commissioning phase.

.3 Complete system checks:

.1 Once during the first month of building operation.

.2 Once during the third month of building operation.

.3 Once between the fourth and tenth months in a season opposite to the first or third month visit.

.4 Complete rectification of all deficiencies revealed by these checks. Equipment manufacturers involved in commissioning shall participate in systems checks.

.5 Revise all "as-built" and operating and maintenance documents to reflect all changes, modifications, revisions and adjustment upon completion of commissioning.

.6 Schedule a question and answer session for the operating and maintenance personnel 3 months after handover of the facility to the Owner's. The duration of this session or sessions will be dictated by the number of questions or concerns that shall be addressed.

1.12 COMMISSIONING INVOLVEMENT

.1 Commissioning Authority shall direct, witness and validate as required; and Contractor and/or his Suppliers or retained Independent Third Party Agents shall perform the following:

.1 Check and ensure installation of systems and equipment to ensure installations are completed and in a proper and safe state ready for testing and commissioning.

.2 Run and test the systems and equipment through their design parameters to verify their capabilities in performance, sequencing, safety protection and alarms annunciation.

.3 Ensure deficiencies and defects found are rectified and replaced and the systems and equipment re-tested as required.

.4 Arrange and provide demonstration and training of Owner's personnel.

.5 Issue Operating and Maintenance Manuals for systems and equipment.

1.13 SYSTEMS TO BE COMMISSIONED

.1 Electrical systems shall include but not limited to following:

.1 Distribution Cables

.2 Transformers

.3 Distribution Panelboards

.4 Branch Panelboards

.5 Coordination study and on-site testing
.6 Automatic Transfer Switches

1.14 TESTING EQUIPMENT

.1 The Contractor and manufacturer shall provide all instrumentation and test equipment necessary to conduct the tests specified during the commissioning process. Contractor shall submit a list of equipment to be used and copies of latest equipment calibration certificates to the Commissioning Authority and Departmental Representative for approval.

1.15 DOCUMENTATION

.1 The Contractor shall record test results and procedures on approved record forms and submit the forms together with copies of test certificates to Departmental Representative and Commissioning Authority for review and approval.

.2 When results are validated, Commissioning Authority shall incorporate those records in his System Operating Manual. He shall also make entry of those test results into appropriate sections of the System Operating and Maintenance Manual as reference for future system/equipment performance tests.

1.16 COMMISSIONING PROCESS

.1 Commissioning Authority: to perform and complete all work as specified in the "GENERAL" Section of this specification "Responsibilities of Commissioning Authority".

.2 Contractors: To perform and complete all works as specified in the "GENERAL" Section of this specification "Responsibilities of Contractor". In general, it shall include complete activation of all systems; calibration, test, and verification of performance of all components, equipment and systems; verification of performance of all systems through all specified modes of control and sequence of operation; rectification of deficiencies; recording of test results for submission; demonstration, instruction and training of Owner's operating and maintenance personnel; follow-up during first year of operation for fine tuning and building service monitoring.

.3 Equipment verification: Contractor shall test and verify proper operation of all equipment and systems prior to start of commissioning and record all results from the test for each piece of equipment. Forms shall be included in the Operating and Maintenance Manual. Equipment data shall include, but is not limited to:
.1 Manufacturer's name, address and telephone number.
.2 Distributors' name, address and telephone number.
.3 Make, model number and serial number.
.4 Electrical: voltage, ampere rating, fault rating, frequency, breaker size, fuse size, overload size.
.5 Equipment enclosure type.
.6 Any other special characteristics.

1.17 TESTING FOR ELECTRICAL SYSTEMS

.1 All systems as specified in Division 26 of the specification.

.2 Test and commission equipment and systems as per Electrical Specification, and the following requirements.

.3 Contractor to submit test reports including the test procedures, results of all items inspected, checked, measured and tested. Comments and deficiencies should also be noted in the reports.

.4 Distribution cables:

- .1 Check cables are properly installed, terminated and tightened to the correct torque values.
- .2 Check and record cable sizes, types and method of installation.
- .3 Check and confirm the installed cable sizes are of adequate rating, taking into consideration the type of cable, the method of installation, the correction factors and any other requirements.
- .4 Grounding test to ensure the equipment, the conduit and the cable armour/sheath, if applicable, are properly grounded.
- .5 Megger test.
- .6 Check and measure voltage and current. For cables in parallel, measure load current on each cable.

.5 Transformers:

- .1 Check and record nameplate data.
- .2 Check and report the transformer enclosure is suitable for the environment in which it is installed.
- .3 Check and record sizes and types of primary and secondary protection devices, conductor sizes and types.
- .4 Check cables are properly installed, terminated and tightened to the correct torque values.
- .5 Megger the primary and secondary windings.
- .6 Measure the primary and secondary winding resistances.
- .7 Measure turns ratio, capacitance and dissipation factor.
- .8 Grounding test to ensure transformer is properly grounded.
- .9 Polarity and phase sequence tests.
- .10 Sound level test for different points at 1 m away from transformers.
- .11 Check and record transformer primary and secondary voltages and load current. Check and record transformer on-load temperatures.

.6 Distribution and branch panelboards:

- .1 Check and record nameplate data.
- .2 Check and report the panel enclosure is suitable for the environment in which it is installed.
- .3 Check cables are properly installed, terminated and tightened to the correct torque values.
- .4 Check and test to verify the panelboard directory is correct.
- .5 Include the directory in the test records. The directory shall contain the size of each breaker, equipment served, cable type and size.
- .6 Check and test the voltage drop is within the specified limit from the service entrance switchboard to the distribution panels and branch panelboards.

.7 Test branch circuits voltage drop is within the requirements.
.8 Grounding test to ensure panelboards are properly grounded.
.9 Megger test.
.10 Set all protective devices to the settings as per the approved Coordination Study.
.11 Test and calibrate the protective devices by secondary current injection. Record the magnitude of the test current, the actual tripping time, and the tripping time from curve.
.12 Measure voltage and load current on each phase. Submit test reports to Departmental Representative. When required, re-arrange branch circuits as directed by the Departmental Representative for proper load balancing.

.7 Coordination study and on-site testing:
.1 Set up all the protective devices, check and verify the frame size, rating of the breakers, relays, switches and types of fuses and record all such ratings and settings in his reports.
.2 Test and calibrate, by secondary injection, all protective devices as per the settings recommended in the study.

.8 Automatic transfer switch: Manufacturer shall perform tests according to CSA C22.2 No. 178 and following requirements
.1 Check and record nameplate data.
.2 Check and report the panel enclosure is suitable for the environment in which it is installed.
.3 Check cables are properly installed, terminated and tightened to the correct torque values.
.4 Check, set and record all settings as per the specification requirements.
.5 Check and test the switch for correct alignment and correct mechanical and electrical operation of switch in different positions.
.6 Test all the electrical control, indication and interface signals with the generators, fire alarm panel, elevator control panels, building management panel or other interface panels.
.7 Test and record phase sequences and voltages.
.8 Grounding test.
.9 Perform all interface test with the generator for starting and stopping.

.9 Other systems as per specification requirements.

1.18 OPERATION AND MAINTENANCE MANUAL

.1 Contractor shall prepare and submit the Operating Manual as detailed in the specification to Departmental Representative six (6) weeks prior to beginning of training.

.2 Contractor shall re-submit the manual should the Departmental Representative find deficiencies. Training shall not begin until the manual has been accepted by the Departmental Representative. One copy of the manual shall be forwarded to Commissioning Authority in good quality, vinyl covered binders.

.3 Project directory shall contain the names, addresses, fax numbers and telephone numbers of Contractors, Subcontractors, manufacturers and manufacturer's representatives.

.4 The Electrical manual shall be contain, but not limited to the following:
- .1 Shop drawings.
- .2 As-built drawings
- .3 As-built riser diagrams.
- .4 Equipment list.
- .5 Testing and verification forms.
- .6 Certification forms.
- .7 Panel directory as applicable.
- .8 Manufacturer's literature on installation, operation and maintenance of the equipment, including trouble shooting procedures.
- .9 Recommended special tools and equipment for the operation and maintenance of the equipment.
- .10 Spare parts list.
- .11 The operating procedures shall be the recommended manufacturer's operating procedures for the equipment.
- .12 The maintenance procedures shall include Scope of Work, frequency of activity, parts required and necessary documentation.
- .13 Spare parts list shall be manufacturers' recommended list for maintenance purposes.
- .14 Trouble shooting guide shall be manufacturer's recommendations for the equipment.
- .15 Equipment list shall include make, model, serial number, voltage, rated current, number of phase and wire and fault rating.

.5 A copy of the Operating and Maintenance Manual shall be submitted to the Owner.

1.19 SYSTEMS OPERATING AND MAINTENANCE MANUAL

.1 The Systems Operating Manual will be used by the maintenance personnel to assist them in the daily operation of the systems.

.2 Systems Operating Manual shall be prepared by Commissioning Authority using data collected by Contractor and test results.

1.20 OPERATING TRAINING AND INSTRUCTIONS

.1 Contractor and equipment manufacturers shall provide operator training for each electrical system and equipment.

.2 The training and instruction shall be provided by qualified technicians and shall be conducted in a classroom setting at the equipment or system.

.3 Training and instruction will begin when the Operating and Maintenance Manual has been approved and delivered to Owner.

.4 Each session shall be structured to cover:
- .1 The Operating and Maintenance Manual;
- .2 Operating procedures;

.3 Maintenance procedures;
.4 Trouble-shooting procedures;
.5 Manufacturer's or service representative's name, address and phone number.

.5 Contractor shall prepare a detailed training and instruction plan. This plan shall include the outline of all sessions and identification of the training presenters.

.6 Submit the plan including a copy of training manual for Commissioning Authority's review and approval.

.7 Provide course documentation for up to six (6) people.

.8 The sessions shall be coordinated and videotaped by the Commissioning Authority.

.9 Training and instruction shall be provided for the electrical systems wherever applicable.

.10 Training and instruction requirement for the electrical system shall include a walk-through of building by Contractor. During the walk-through the Contractor shall:
.1 Identify, describe and explain the function of equipment.
.2 Detailed explanation of the operation, including mechanical and electrical operation of the equipment; procedures and sequence of operation; procedures of switching.
.3 Detailed explanation of the maintenance of the equipment including procedures and items to check for.
.4 Safety procedures to be implemented before the maintenance.
.5 Interface and control with other equipment.
.6 Fault finding procedures.

.11 When each session has been completed, the Commissioning Authority shall sign to certify completion.

1.21 SYSTEM DEMONSTRATION AND TURNOVER

.1 System demonstration and turnover to the Owner shall occur when:
.1 The installation is complete.
.2 Acceptance test conducted by the Departmental Representative has been successfully completed.
.3 Commissioning Authority system testing has been successfully complete.
.4 Training and instruction has been completed.
.5 Operating and Maintenance Manual has been accepted.
.6 Shop drawings have been updated.
.7 As-built drawings have been completed.

.2 Systems demonstration shall be conducted by Contractor and manufacturers. The demonstration shall cover all operation and maintenance requirements and a physical demonstration of equipment installation and operation.

1.22 TESTING FORMS

.1 Contractor and manufacturers shall provide information required to complete forms listed in this Section and any other additional data sheets not included in this specification, but required for the electrical systems of this Project. All forms to be provided by the Contractor and shall be approved by the Departmental Representative and the Commissioning Authority.

.2 Commissioning index form shall be maintained by Commissioning Authority to track progress of the commissioning requirements.

.3 Electrical testing and verification forms to be completed are as follows wherever applicable, but not limited to:

.1 Equipment test form.
.2 System and equipment warranty dates form.
.3 System verification form.
.4 Test identification form.
.5 Testing and start-up schedule form.
.6 Transformer testing and commissioning form.
.7 Distribution cable testing and commissioning form.
.8 Panelboard testing and commissioning form.

1.23 EQUIPMENT AND SYSTEM WARRANTIES

.1 Equipment and system warranties shall not begin until the system demonstration and turnover has been conducted successfully and accepted by the Owner.

.2 Contractor shall fill-out the warranty form listing the equipment and systems and the start and finishing dates for warranty.

.3 Refer to Division 01 and Division 26 of the specification for the requirements during the warranty period.

.4 Contractor shall re-visit the building during the warranty period with Departmental Representative, Commissioning Authority and Owner. During this visits the performance of the system shall be reviewed. The Owner shall organize this visit.

.5 At this meeting, the Owner, Departmental Representative and Commissioning Authority shall review the performance of the systems. If the performance is satisfactory then no further action need to be taken. If unsatisfactory then Contractor will be instructed to correct deficiencies, at his cost, to the satisfaction of Departmental Representative.

The bid documents shall be amended, and new drawings and clauses added, and shall become part of the contract documents as follows:

Drawings:

1) **Reference Drawing E301:**

.1 Revise 'Key Note' no. 2 to read as follows:
"Existing pneumatic VAV box to be removed and replaced with new digital controls VAV box (by others)."

2) **Reference Drawing E302:**

.1 Revise 'Key Note' no. 2 to read as follows:
"New digital controls VAV box (to replace existing pneumatic). Provide new 120V circuit in ceiling junction box for use by mechanical controls. Obtain circuit from 1P,15A circuit in panel '1N'."

.2 Revise 'Key Note' no. 3 to read as follows:
"New fume hood (to replace existing) supplied by others, wired by electrical. Fume hood receptacles are also to be replaced with new. New receptacles shall match existing in a like-for-like fashion. Re-use existing circuitry. Trace out and label existing circuitry to fume hoods and associated wiring devices during installation of replacement fume hoods."

3) **Reference Drawing E303:**

.1 Revise 'Key Note' no. 1 to read as follows:
"Existing pneumatic VAV box to be removed and replaced with new digital controls VAV box (by others)."

4) **Reference Drawing E304:**

.1 Revise 'General Note' no. 2 to read as follows:
"Where existing fume hoods are replaced with new, fume hood receptacles are also to be replaced with new. New receptacles shall match existing in a like-for-like fashion. Re-use existing circuitry. Trace out and label existing circuitry to fume hoods and associated wiring devices during installation of replacement fume hoods."

.2 Revise 'General Note' no. 3 to read as follows:
"Where indicated for a new VAV box to be installed (replacing existing pneumatic). Provide new 120V circuit in ceiling junction box for use by mechanical controls. Obtain circuits from panels as indicated."

5) **Reference Drawing E305:**

.1 Revise 'Key Note' no. 1 to read as follows:
"Existing pneumatic VAV box to be removed and replaced with new digital controls VAV box (by others)."

6) Reference Drawing E306:

.1 Revise 'General Note' no. 2 to read as follows:
"Where existing fume hoods are replaced with new, fume hood receptacles are also to be replaced with new. New receptacles shall match existing in a like-for-like fashion. Re-use existing circuitry. Trace out and label existing circuitry to fume hoods and associated wiring devices during installation of replacement fume hoods."

.2 Revise 'General Note' no. 3 to read as follows:
"Where indicated for a new VAV box to be installed (replacing existing pneumatic). Provide new 120V circuit in ceiling junction box for use by mechanical controls. Obtain circuits from panels as indicated."

Specifications:

1) Reference Specification Section 26 05 01:

.1 Replace section 26 05 01 with new, attached, dated 2015-11-23.

2) Reference Specification Section 26 24 16.01:

.1 Revise 26 24 16.01, 2.2.6 to read as follows:
"Copper bus with neutral of same ampere rating as mains."

Les autres termes et conditions restent les mêmes